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ABSTRACT

This paper follows up on an earlier report that presented a theory on instructional processes that relied on a time metric. In this paper a design for field studies within this theoretical orientation is presented. Methods to obtain information on how teachers allocate time so that grouping and individualization strategies can be studied are discussed. Sampling procedures for observations are recommended, and a data file structure for this kind of information is explained. (Authors)

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BTES

BEGINNING TEACHER EVALUATION STUDY

Technical Report Series

Technical Report 75-10-11

Notes for a Field Study of Instructional Time

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and
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University of Chicago

October, 1975

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
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Notes for a Field Study of Instructional Time*

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October, 1975

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PREFACE

This is one of a series of reports by the Far West Laboratory for Educational Research and Development concerned with the study of teacher effectiveness. Under contract to the California Commission for Teacher Preparation and Licensing, with funding provided by the National Institute of Education, the Laboratory is studying teachers in second and fifth grade classes in order to identify teacher behavior and classroom qualities that are related to reading and mathematics achievement.

The California Commission is the agency charged with certifying the appropriateness of teacher training programs throughout the state. To carry out its duties the Commission needs information about what teacher behaviors are related to student outcomes. This information will then be used jointly by the Commission and the State institutions that it certifies in order to better insure that beginning teachers receive training in areas that have been empirically demonstrated to affect student learning. To obtain the information they need, the Commission has undertaken a multi-year research effort titled the Beginning Teacher Evaluation Study (BTES).

This report by Drs. Harnischfeger and Wiley is a continuation of their research done under subcontract to the Laboratory during 1974-75. They have developed for the BTES staff a conceptual scheme for studying time allocation in schools. The first part of their work was reported as Technical Report 75-3-1, Teaching-Learning process in elementary school: A synoptic view, and is available from the Laboratory. In this report, concluding their current work for the BTES project, they present their views about how a field study of instructional time can be conducted. Their work has influenced the BTES project staff and resulted in the design of a field study examining the relationship between instructional time, opportunity to learn and student

achievement. That study is presently underway, and will be documented in a future technical report in the BTES series.

Researchers interested in instructional time allocations in natural environments will find the two technical reports by Harnischfeger and Wiley of interest. They may also wish to see BTES Technical Notes II-1, and II-2, on the design and instrumentation for the study of instructional time that is presently underway. These Notes were written by Dr. Charles Fisher, during August 1975.

As with all documents in the BTES series, this report does not necessarily reflect the views and opinions of the California Commission on Teacher Preparation and Licensing, or the National Institute of Education.

David C. Berliner
Principal Investigator
Beginning Teacher Evaluation Study
October, 1975

I. Review of the Structure of the Classroom Day

This design and analysis discussion is based on the conceptual framework outlined in Harnischfeger and Wiley (1975). That paper presented a structural conception of an elementary school classroom day. It is important that this conception be clearly in mind while detailing design and analysis strategies. Consequently, we repeat the most salient sections of that paper (pp. 31-32; pp. 45-51).

We now detail these settings from the prospect of the teacher. First, we narrow or focus to that part of a teacher's school day spent with pupils inclass, i.e., inschool preparation, recess, and lunch times are excluded. After rationing the teacher's inclass time into amounts alloted to particular subject matter areas, we now magnify the teacher activities within one area in a fashion that likewise applies to others. The design or working plan which the teacher uses to apportion her inclass time among these types of activities, constitutes her grouping and individualization strategy.

We unfold the teacher's total inclass time for a specified subject matter into four setting categories which form the basis for a complete parti-

tioning of the instructional time a teacher spends in the classroom:

(1) Whole Class Activities

(2) Subgroup Activities

(3) Teacher-Supervised Individual Pursuits

(4) Teacher Managerial Activities

The first three account for that portion of a teacher's inclass time devoted to goal-specific instruction in the particular curricular area. The last category includes teacher inclass planning in so far as it is related to the specific subject area. But it also encompasses that time which is needed to reassign pupils from one activity to another, e.g., from whole class instruction to subgroup instruction, from supervised to non-supervised group instruction, or from individualized instruction, supervised or not, to another setting, all in the specified subject area. These times are likewise part of teacher management.

As we now focus on a specific pupil (K), we may decompose the total time a pupil spends on a subject matter (X) into seven categories (Figure 4):

(1) Whole Class Pursuits

(2) Teacher-Supervised Subgroup Pursuits

(3) Teacher-Supervised Individual Pursuits

(4) Unsupervised Subgroup Pursuits

(5) Unsupervised Individual Pursuits

(6) Transitions

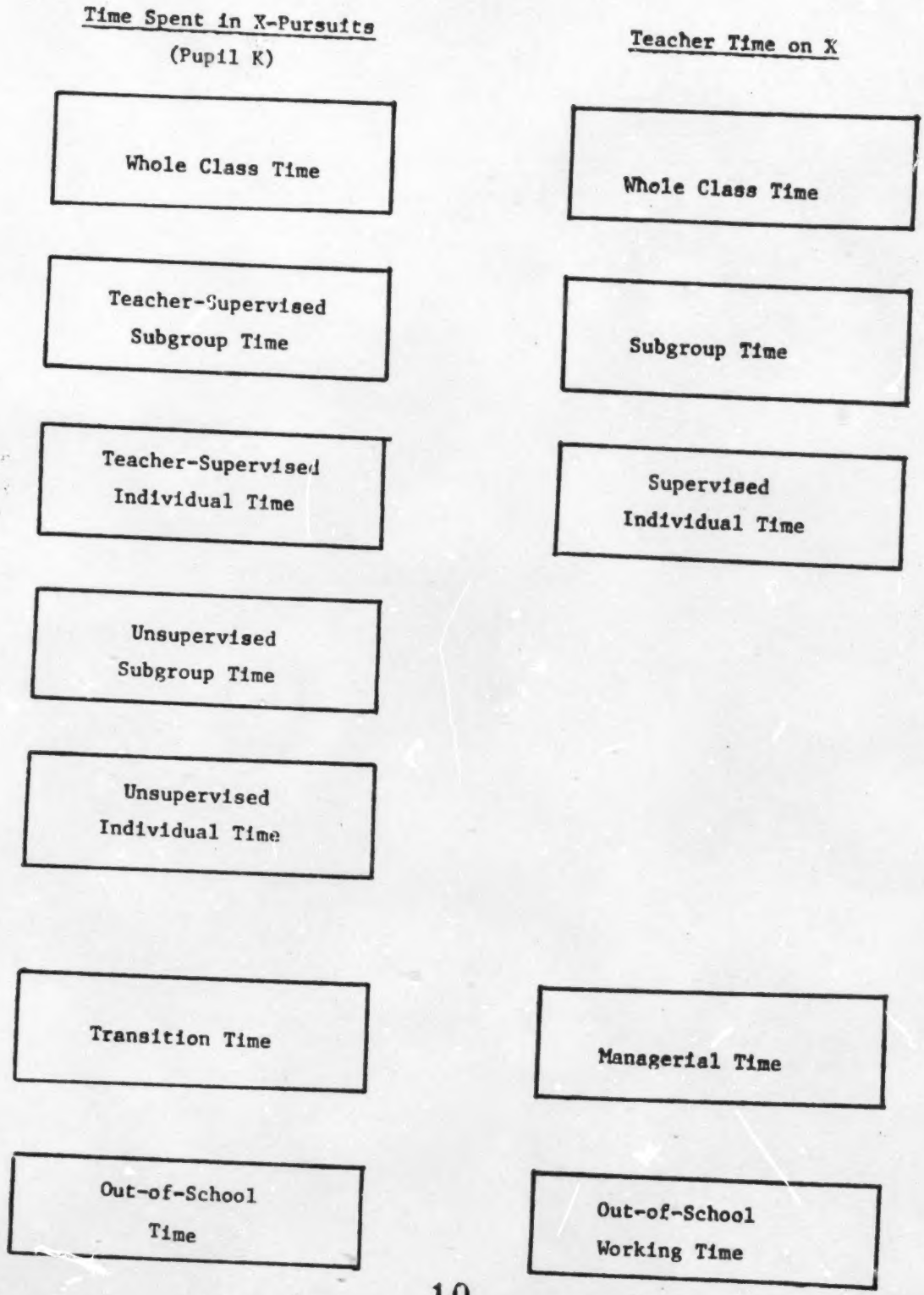
(7) Out-of-School Pursuits

These learning settings are defined by grouping and supervision within a specific subject area. They are distinct from those used to categorize teacher activities in that pupil pursuits can be unsupervised as well as supervised (Figure 1).

Insert Figure 1 about here

The first three parts correspond to the teacher categories. Except for absences, whole class time is identical for the teacher and pupils, as all pupils are exposed to whole class instruction. However, the subgroup time is distinct for the teacher and for specific pupils, because the teacher does not spend all of her subgroup time with the group of which pupil K is a member. This difference also holds for the teacher-supervised individual time. A particular pupil receives only a small portion of teacher tutoring. Pupils spend their remaining inclass time in non-supervised individual (seat)-work, group work, and in transitions between pursuits. Finally, school-based learning does not only occur in the classroom. A major portion of the learning activity of a pupil takes place outside the school,

Figure 1. Unfolding of Time Allocations to Learning Settings



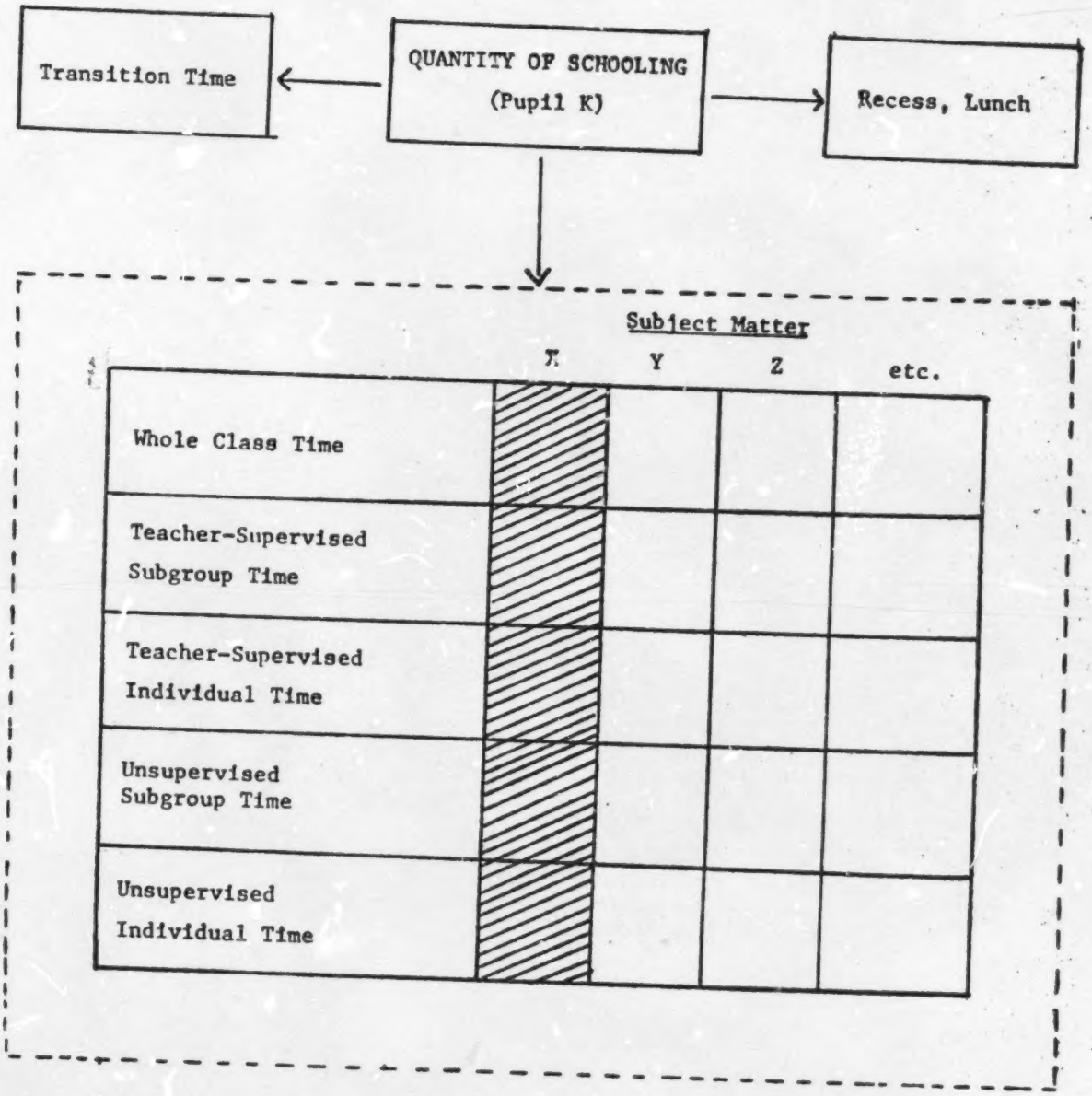
but is conceived, planned, and assigned by the teacher. As such, homework is clearly an important vehicle for school learning.

The inschool settings for individual pupils together with the curricular areas allow us to subdivide the total inschool time for a particular pupil, i.e., his school day, into the time he spends, e.g., in mathematics seatwork, in a reading subgroup, or in total class instruction in biology. The total time ledger on school-related work for the teacher and the pupils has also to account the teacher's out-of-class and the pupil's out-of-school working times. But for now, we only tally inschool time, and our current model specification solely analyzes one curricular area (Column X in Figure 2).

Insert Figure 2 about here

We are now in the position to describe the segments which are instrumental in the differentiation, detailing, and totaling of a pupil's quantity of schooling. As we said above, the total amount of a pupil's schooling in relation to a subject area depends on the quantity offered -- lengths of school day and year -- on his absences, on the subject matter priorities, and on the teacher's allocations of instructional time to that pupil (K) as an individual. Furthermore, we have learned that the part of a pupil's total quantity of schooling which is directly relevant to curriculum goals, is also determined by the extent of such non-curriculum-related activities as recess, lunch, and inclass transitions.

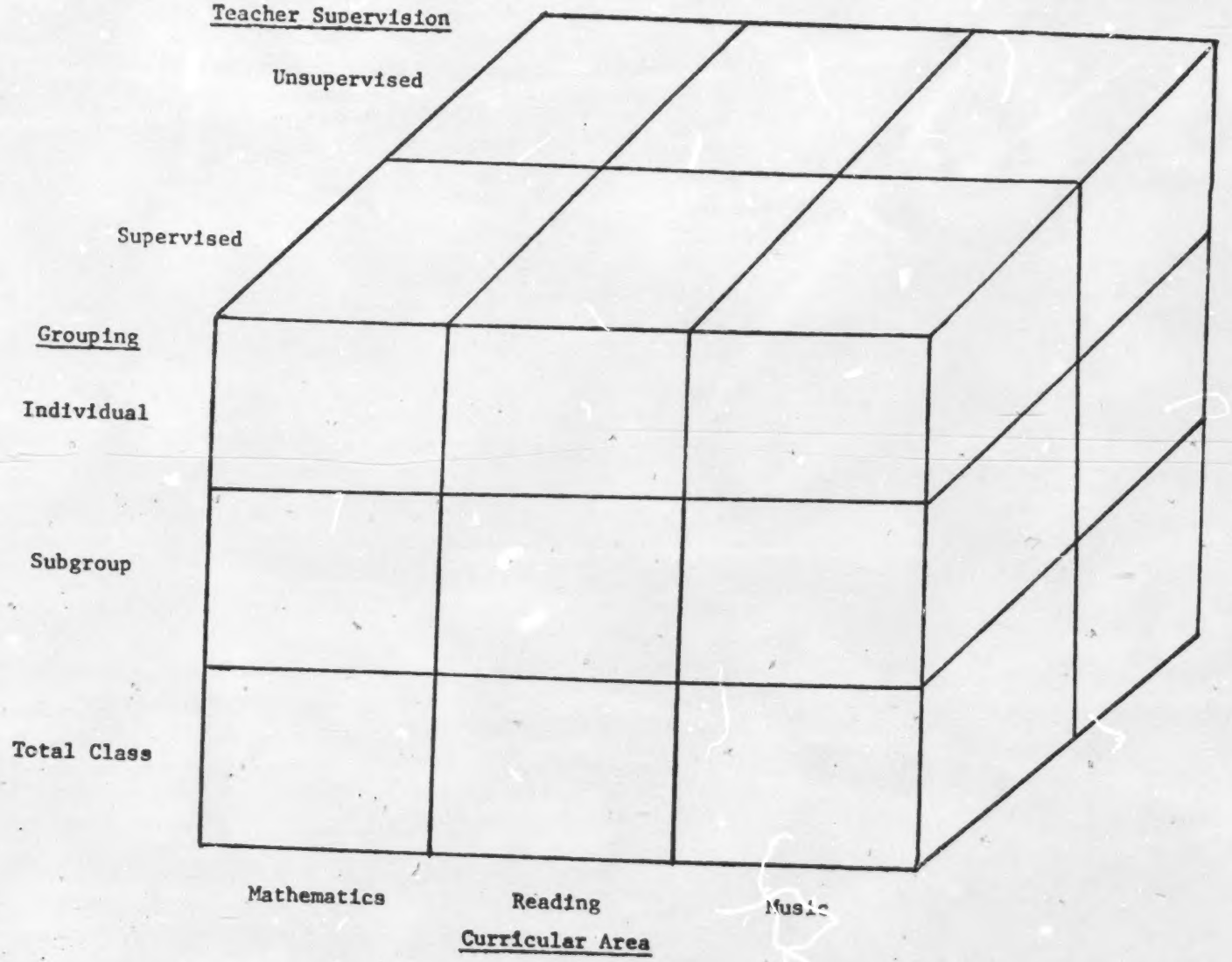
Figure 2. A Pupil's Classroom Learning Settings



The molecular unit of an individual's quantity of schooling is a specific learning pursuit of that pupil (K), i.e., a specific assignment to a learning setting. This learning pursuit is delimited by the learning setting which it concretizes, i.e., by curricular areas, grouping, and teacher supervision. When any of these change, that is, when the setting is switched, a particular pursuit ends. Transition periods initiate and terminate particular pursuits. Thus, the total reading-group time a pupil spends is the sum of all the reading-group pursuit-times accumulated through the day, week, or year.

To summarize a teacher's curricular priorities and teaching strategies as they are implemented for a class and its pupils, we refer to Figure 3. This display facilitates the accounting of pupil inclass time in terms of the curriculum, the grouping strategy, and the kind of teacher supervision, i.e., the learning setting. The diagram has arbitrarily nominated three subject areas to exemplify the variety of possibilities. It has delimited a particular learning setting within an area by marking whether the setting consists of the total class, a subgroup, or a single individual; each of these alternatives either teacher directed or not. The five prevailing combinations -- unsupervised total class settings have been excluded from explicit discussion because of their presumed rarity in elementary school -- together with transition categories within and between subject areas, permit the accounting of the totality of inclass time for a single pupil. Tallies will vary within a class because of differences among pupils in group membership, absence, as well as choice and interactions with the teacher on an individual basis.

Figure 3. Categories for Pupils' Inclass Time Accounts



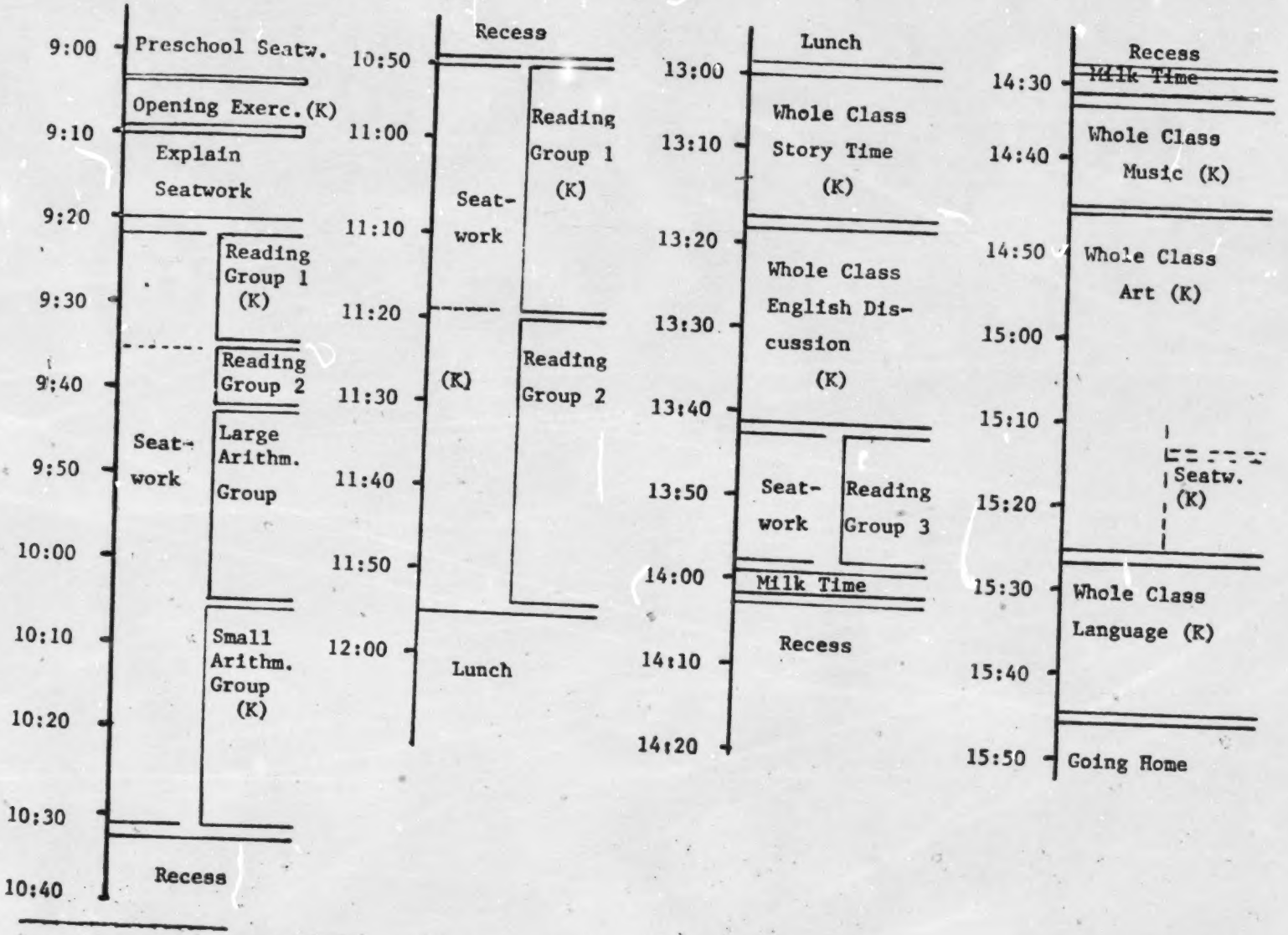
Insert Figure 3 about here

These reckonings may be summarized and aggregated in a number of profitable fashions. Sums by curricular area, grouping category, or teacher supervision describe aspects of the learning opportunity structure for an individual pupil. Aggregations of the complete accounting or its summations over pupils characterize the curricular precedences and instructional schemas of a teacher as they are carried out. Further cumulations for types of pupils or classrooms with specific attributes would bear upon curricular decisions or assessments of equality of educational opportunity.

To concretize these implemented priorities and strategies and their consequences for the parcelling and disbursement of the pupil's quantity of schooling, we adapted a display that Gump (1967; Appendix B) constructed (Figure 4). It sequentially depicts a whole school day for a third grade class in terms of subject areas; whole class, subgroup, and individualized work; transitions; and milk, recess, and lunch times. We consigned our focal pupil (K) to the first Reading Group and the Small Arithmetic Group and then tallied the amounts of schooling he received during that day in specific subject areas and groupings (Table 1).

Insert Figure 4 and Table 1 about here

Figure 4. A Day in Mrs. Carr's Third Grade Class*



* Adapted from Gump (1967, Appendix B).

Table 1. Time Allocations to Learning Settings in Mrs. Carr's Third Grade Class

Pupil Academic Pursuits

Curricular Area	Whole Class Pursuits	Teacher-Supervised Subgroup Pursuits	Unsupervised Individual Pursuits	Sub-total (min.)	% Academic	% All
Reading		41		41	15.2	10.2
Language	58			58	21.5	14.5
Arithmetic		27		27	10.0	6.7
Music and Art	42			42	15.6	10.5
Unknown Academic	9		93	102	37,8	25.4
Subtotal (minutes)	109	68	93	270		
% of Academic Pursuits	40.4	25.2	34.4		100.0	
% of All Pursuits	27.2	17.0	23.2			67.3

All Pupil Pursuits

	Academic	Opening	Milk	Lunch &Recess	Tranditions	Total
Minutes	270	5	6	89	31	401
%	67.3	1.2	1.5	22.2	7.7	100.0

Academic Teacher Activities (Excluding Transitions)

	Whole Class	Subgroup	Total
Minutes	109	153	262
%	41.6	58.4	100.0

The actual school day started four minutes late at 9:04 a.m. and ended at 3:45 p.m., i.e., its length was six hours and forty-one minutes. If we deduct lunch and recess time (1½ hours) we find that the pupils spend 5¼ hours in class. But not all of that time is usable for teaching and learning. Milk time and opening exercises occupy eleven minutes, so that only a little more than five hours remain. All of these constraints hold for every pupil in the classroom. Only within them, pupils' instructional times vary depending on their group assignment and consequent transition periods.

For Pupil K, we calculate that he spent about one-half hour in transitions between activities or pursuits, leaving four and one-half hours for actual learning settings. Looking at the curricular areas, we note that the emphasis is obviously on reading and language, amounting to 37 percent of Pupil K's time while he spent only ten percent of his instructional time on arithmetic.

However, we are not entirely confident of the completeness and representativeness of these time allocations among subject areas, because we have accounted for only a single day and because we lack information on the curricular pertinence of the seat-work settings, which account for fully one third of our pupil's activities. This handicap serves to underline the importance of an exhaustive accounting of all pupil activities and pursuits, not only with respect to grouping but also curricular area and supervision, another factor about which we lack explicit information for our example.

Our exemplified teacher spent all of her time allocated for arithmetic, in subgroup instruction, which was also true for reading, while for language, art, and music, she decided to spend the entire time with the class as a whole. Again, we should keep in mind that we do not know the contents of her seat-work assignments. On the whole, she spent about 58 percent of her instructional time in subgroup instruction, of which Pupil K received less than half. As every pupil is included in whole class instruction, if not absent, Pupil K and his teacher spent identical quantities of time (40%).

II. Design Strategies

1. Characteristics of Time Allocations About Which Data Are to Be Collected

1.1 What Are the Learning Settings?

As outlined above, we define learning settings in terms of subject matter (reading, mathematics, etc.), grouping (whole class, small group, individual), and teacher supervision (present or absent). Within a subject matter area, this system defines six potential learning settings, although all of them will not be used in specific areas. For example, the main method of teaching reading, when the teacher is present. The teacher is likely to be small group instruction, the traditional reading group. Whole class instruction in reading will be non-existent in most classes. Also, most reading instruction occurs with the teacher present. The teacher is absent very little except when support for individual seatwork is likely to be

found. In mathematics, however, the main patterns are likely to be whole class instruction, supervised by the teacher, and individual tutorial seatwork. The whole range of forms will occur, however, in other subject areas.

The important point is that these learning settings will be the modules for teacher planning, and that they can serve as a focus for communication about planned and implemented instruction prior to actual observation. The basic recording system for learning settings should therefore consist of a three-character code, each character representing a category system (subject matters, groupings, teacher supervision). As a consequence, the basic recording system will consist of a code for learning settings, together with the on-set and off-set times for the setting observed.

Two characteristics of these settings which are fundamental, but not defining, are the memberships of the groups during their meetings and the subject matter contents covered during those meetings. The first of these is vital to turning imformation about general classroom time allocation into such information for each individual pupil in the classroom, reflecting variation in group assignments, absences, and individualized work. The second is basic to the matching of content coverage to tested achievement. It reflects the details of the content to which individual pupils are exposed. Problems of data collections of this type are discussed below in Section 1.3.

1.2 What Characteristics of Learning Settings Are Assessed?

Of course, learning settings of the same basic type will differ in the ways in which they are implemented. Characteristics of the task, the teacher's relationship to the pupil, and the pupil's relation to the task and to the other pupils participating, will differ from time to time. From our perspective, these differences can be of two distinct types: those which are systematic and persist over time and those which are idiosyncratic and vary without conscious planning.

The systematic variations should eventually be incorporated into refined definitions of learning settings insofar as they are not redundant with the current defining characteristics. For example, if teachers plan and implement two distinct modes of reading group instruction, then we must eventually incorporate that distinction into the definition of learning setting. If, on the other hand, there is only one mode of reading group instruction, even though this mode incorporates a particular behavioral role for the teacher and a specific type of pupil participation, we need not complicate the definitions of basic learning settings, as such complications would not change the number of settings used. In this case, we would treat additional setting characteristics as important but non-defining. The following six characteristics of learning setting implementations will serve as a basis for both refinement of setting definition and secondary setting characteristics:

-- teachers' behavioral role (recitation leader, observer etc.),

-- type of pupil participation (including relations to teacher and tasks),

-- extensiveness of pupil participation,

-- degree of pupils' task control (including pacing),

-- role of materials in task,

-- interrelations among pupils.

A coding system must be developed so that these characteristics and changes in them, within settings, may be recorded (see Joyce, 1975, for similar ideas about what is important to code in classroom observation).

1.3 How Are Details of Curricular Content Assessed?

The curricular content covered in any classoom is anchored in the curriculum materials which the teacher uses to originate and implement her instruction. Each classroom traces a path through its own materials. That is to say, these materials are used sequentially by the teacher in planning and implementing her instruction. The materials which are used on one day, are not those which are used on another. This implies that the teacher's instruction orders these curricular materials.

Records of this ordering must be kept for the class as a whole and for each pupil. If the curriculum is common to most individual pupils in the classroom, then the primary task is the recording of the orderings of the materials of this common curriculum. In this case, variations in curricular

orderings for individual pupils can be handled as deviations from the common orderings. If, however, there is great heterogeneity in the individual orderings, basic records must be maintained by pupil.

In mathematics, for example, the ordering of curricular content and consequently curricular materials should be nearly identical for everyone. The pace in which individuals proceed during this common ordering may, however, vary tremendously. In reading, though, the materials are likely to differ from subgroup to subgroup, requiring the maintenance of basic ordering records by classroom group. Within these groups coverage order is likely to be homogeneous. In areas of instruction outside of basic skills, instruction may be highly individualized.

These orderings are probably best recorded by maintenance of <u>materials books</u>. These books should include all materials in the order in which they are used plus page references to textbook assignments, workbook assignments, and similar formally printed materials. Each assignment given by the teacher using these materials (or not) should be recorded and assigned an accession number indicating the order in which the assignments were given. This then constitutes a complete record of all assignments in the order given.

The accession numbers may be used to characterize the particular subject matter content covered in a given learning setting. Each individual (and the class as a whole) may be characterized as to the content covered

in a particular learning setting by this means. This procedure postpones to the data-analysis stage the necessity of hierarchically structuring the subject matter and matching it to the content of the achievement tests (see Section III.1.4).

2. Assessing Teacher Planning

As we have stated before (Harnischfeger & Wiley, 1975), planning is an important part of teaching(p.25).
A major part of the teacher's job is to turn a set of curricular goals and related content into a working plan. Aspects of planning include textbook and material selection, processes for initial subgroup formation, longterm strategies for content coverage over the school year, learning assessments of individual pupils, subgroup reassignments, setting learning goals for specific pupils, scheduling of lessons, and detailed planning for instruction on particular days.

Teachers plan or prepare -- to differing extents -- their inclass time in advance. These preparations may be formal -- explicit lesson plans for the next day's, week's, or even later teaching -- or so informal that the teacher is only conscious of them when they are implemented.Much of informal planning is the product of past years of preparation by experienced teachers. This planning -- implicit or explicit -- usually includes rough time allocations to subject matter areas and decisions about grouping strategies to be used within them.

How is planning to be defined within the context of an empirical study, given the implicit nature of much planning? For the purpose of such a study, we define planning in terms of teachers' detailed expectations about the events which will occur in the classroom, however these expectations are derived. They may result from recent and explicit plans, they may come from longterm experiences, built up over a number of years of teaching, or they may derive from the structure of prepackaged curricular components (e.g., ETUs).

Information to be collected about planning falls in three basic areas:

The Sources of Planning. Information concerning the sources of planning relates to the district's curricular policy, including preselected curricular materials, the roles of the principal and other teachers in influencing decisions of a particular classroom teacher, her past experiences and training, and the potential for freedom of choice, whether exercised or not.

Constancies in Planning and Implementation. Certain characteristics of plans are also characteristics of implementations. The groupings which the teacher creates, the pupils who are assigned to those groupings, and their relationship to subject matter areas are common to planning and implementation.

Expectations about Actual Teaching Implementation. Expectations about a

classroom day take explicit form, such as lesson plans, but are also implicit. Implicit plans can be made explicit for research purposes by asking the teachers about the constancies in activities over time (e.g., is the first reading group usually convened at 9 o'clock every morning?) and by requesting rough time allocations to and sequences of learning settings prior to their implementation. These judgments may also be characterized by their expected accuracy as well (see Morine, 1975, for a study of planning which taps some of these dimensions).

3. Design of Daily Observations

3.1 Observers and Observational Procedures

There are three fundamental observational problems in a study of time allocations and its linkage to achievement outcome. -- The first is a characterization of the structure of classroom activities in terms of learning settings. This chracterization describes the one or more learning settings occuring within a classroom, at any given point in time, together with the beginning and ending of each of the transitions between them, for the entire school day. -- The second task is the accounting of the participants in each of these settings. -- The third is a characterization of the implementation of these learning settings in terms of curricular content purveyed and secondary setting characteristics. It is this complexity which requires two observers in each classroom.

In general, decisions about the division of responsibility between observers should be made on the basis of the classroom organization and planned activities. In an ordinary self-contained classroom with a relatively consistent rhythm of activities, it would probably be most economical and precise to have -- except in the case of whole class instruction -- one observer focussing on the teacher and those activities which she implements directly, while the other observer is focussing on those activities which do not directly involve the teacher. If particular pupils are selected for intensive observation, then perhaps this division would be modified.

In addition to their classroom observation responsibilities, the observers would have systematic contact with the teacher before and after the school day. This contact would facilitate the reporting of teacher plans, the gathering of observational data, the precollection of educational materials, and the checking on perceptions of classroom events.

3.2 The Who and When of Observation

The following are basic recommendations on the extensiveness of data collection within a classroom day:

-- information on time allocation to learning settings and transitions should be collected for all pupils and the teacher;

-- time allocation should be collected for the whole classroom day;

-- instructional materials should be collected and sequenced as discussed in Section 1.3; in addition, basic information on all out-of-class assignments and homework should be collected including the associated curricular materials.

One finding of the pilot study might well be that it is not possible with the resources available to collect and sequence curricular materials and experiences for all pupils because of the diversity of such experiences. In this case, in order to complete a refined analysis of the relations between time allocations and achievement, it may be necessary to select a small number of pupils for intensive observation and analysis. This may occur because curricular variation may cause more extensive curricular content coverage data collection.

3.3 The Role of the Pilot Test

A pilot test is, of course, necessary to develop and refine observational procedures. An especially critical aspect of the pilot study is to assess the extensiveness of the variability in curricular coverages of individual pupils. If they are extremely variable, in both the particular contents covered and in the order of coverage, then a much greater quantity of information will have to be collected about each individual pupil. If this quantity is quite large, then it may be necessary to select a small number of pupils per class for intensive focus in the main field study.

4. Sampling (Selection) of Teachers, Classrooms, and Days

The strategy we suggest is one of dense observation over a relatively short period of time. In a study of two weeks duration, we would strongly recommend complete accounting of time allocations for all ten school days intervening between pre- and post-achievement measurements. This density is necessary because, as the percentage of exposures to particular curriculum content areas are less and less densely measured, the observed relationship between exposure time and achievement is attenuated. In most studies of instructional effects, the total educational experiences of pupils which are relevant to the achievement measurements are only weakly sampled. This sparseness is the main factor accounting for the paucity of observed relationships. The basic reason for this is that when the percentage of exposure time sampled is low, the unobserved exposures account for large proportions of the variation in achievement, and these unobserved experiences are only weakly related to the observed ones, resulting in a low correlation between observed and actual exposure.

If the resources available for this study and the density of the measurement desired imply only a limited number of teachers/classrooms, perhaps 20, then it is meaningless to attempt representative sampling of classrooms or teacher types. The most productive strategy is to select in a balanced fashion characteristics of teachers/classrooms and pupils thought to be most relevant to the variable under study, in this case time allocation.

As the study as a whole has attempted to identify teachers with varying characteristics, some of which are expected to directly relate to achievement outcomes, these characteristics will be appropriate as a basis for teacher selection. Probably the most relevant characteristics of pupils/classrooms are grade level and those related to socio-economic status of pupils. It would seem that pupils of different socio-economic backgrounds and grade levels would receive different time allocations among and within basic skill areas such as mathematics and reading. Perhaps a simple and productive design would have eight cells: Four containing high and four containing low SES-pupils with relevant teacher characteristics and grade levels differentiating cells within similar pupil status groups.

III. Analysis Strategies

1. Data File Structure

The problems of file construction in this study have some unique aspects which require clear exposition. We can organize the issues around two foci: the hierarchical organization of these data and the file construction problems for time allocation data. The data from this study are hierarchically organized in the sense that variables are defined at two distinct levels: class/teacher and individual pupil.

This aspect of the data organization together with the fact that data analyses will be performed involving multiple levels creates special problems.

They will require the construction of a sequence of files, defined by level, containing overlapping content through aggregation.

Time allocation data will be obtained from observations at both levels of the hierarchy. This will require special files to be constructed involving on-set and off-set times for particular activities by type of activity for each individual over determinant time periods. One difficult task with the construction of these files is the fact that different teachers and pupils will have, at the most refined level, different activity-category structures. This is an especially severe problem for teachers and pupils in classrooms with distinct curricula, because of the non-overlapping instructional activity types appropriate for programs with different goals.

The files must also be constructed with the analysis consequences clearly in mind. Activity time allocations must be aggregable over categories to produce comparable summary time allocations over programs; pupil-level time-allotment files must be easily constructable from files containing teachers' time allocations to their grouping involvements, together with the individual pupil's group assignments and absence histories.

The data files containing the time allocation data must be easily accessable for the purpose of creating secondary files which summarize the projected achievement consequences of these allocations. This process will involve combining these time data with detailed curricular coverage in-

formation derived from the material sequencing discussed in Section II.1.3. The analysis problems related to accounting the achievement consequences are more fully discussed in Section III.1.4.

2. Analysis of Allocations to Learning Settings

The basic data to be filed for teachers and pupils will consist of the beginning and ending times of each activity which that individual has participated in over the duration of the study. These activity records will be converted to actual time allocations for those individuals by calculating the duration of each activity from its terminal time point and then aggregating all of these durations over particular instances of the learning settings of a given type, e.g., the ten meetings of the low reading group over a two week period. Thus, the first data summary will resemble Table 7 of Harnischfeger and Wiley (1975) which is reproduced as Table 1 in this report.

These summaries can be further aggregated over pupils within a classroom and combined with similar teacher time allocations to out-of-class activities to produce summary tables which characterize the direct and indirect services which a teacher offers to her pupils. For illustrative pruposes an oversimplified set of such tables is given in Table 2 below.

Table 2

Summary Time Allocation Chart for a Single School at One Point in Time

Teacher A full time in this school

Type of Pupil	Number of Pupils	Allocated Hours per Week per Pupil				
		Teacher-Pupil Interaction			Non-Interaction	Out of Class
		Mathematics	Reading	Other		
Comp. Ed.						
Low SES	25	4.0	6.5	1.0	13.0*	15.5**
High SES	5	2.5	4.5	2.0	15.5*	15.5**
Non-Comp. Ed.						
Low SES	0	0.0	0.0	0.0	0.0	0.0
High SES	0	0.0	0.0	0.0	0.0	0.0
Total	30					

Teacher B half-time in this school;

Comp. Ed.						
Low SES	37	0.0	3.0	0.0	0.0	17.0***
High SES	8	0.0	3.0	0.0	0.0	17.0***
Non-Comp. Ed.						
Low SES	0	0.0	0.0	0.0	0.0	0.0
High SES	0	0.0	0.0	0.0	0.0	0.0
Total	45					

Teacher C full time regular teacher in this school;

Comp. Ed.						
Low SES	12	3.5	6.0	1.5	13.5*	15.5**
High SES	3	3.0	5.0	1.0	15.5*	15.5**
Non-Comp. Ed.						
Low SES	2	3.5	6.0	1.5	16.5*	12.5**
High SES	8	3.0	5.0	1.0	18.5*	12.5**
Total	25					

*Average time during which pupils are in the classroom, but not directly supervised by their teacher.

**Teacher working time outside of the classroom.

***Average working time in this school during which pull-out teacher is not in contact with an individual pull-out pupil.

Table 2 gives a summary of time allocations to five gross educational activity categories for three hypothetical teachers/classrooms. The activity categories in the example are greatly oversimplified but serve to present the basic algorithm of our general strategy. The table may be read in terms of the total number of hours allocated, directly and indirectly, by a teacher to a typical pupil of a specific type. For example, Teacher A directly supervised a typical pupil -- targeted for Compensatory Education and of lower socio-economic status -- in reading activities for 6.5 hours. This pupil participated in unsupervised classroom activities for 13 hours and this teacher devoted 15.5 hours of her working week to non-classroom activities. These times total a 40-hour work week for this teacher. Our hypothetical study is composed of two regular classes (Teachers A and C) and a compensatory pull-out reading program (Teacher B). The time allocations to all activities connected with these settings, for each type of pupil, are given in Table 2.

Table 3 contains a summary of these allocations for various types of pupils. This type of table, using more varigated activity categories, and more refined pupil types, will form one of the basic characterizations of classroom instruction.

Table 3 Average Interactive Hours per Week per Pupil

Type of Pupil	Number of Pupils	Mathematics	Reading	Other
Compens. Educ.				
Low SES	37	3.84	9.33	1.16
High SES	8	2.32	7.69	1.63
Non-Comp. Ed.				
Low SES	2	3.50	6.00	1.50
High SES	8	3.00	5.00	1.00

3. Functional Differentiation of Learning Sub-Settings

There are two basic concerns with the differentiation of learning settings within a given type. As mentioned above, one of these is the creation of more differentiated types of learning settings by subdivision of current setting categories. The basic criterion for this differentiation is whether or not it occurs within teacher planning, i.e., whether it is manifestly systematic or only idiosyncratic. Those characteristics of learning settings which might serve to differentiate planned differences in the kinds of instruction offered were listed in Section II.1.2.

In addition, it is important to differentiate settings not only by their role in teacher planning but also by variations in their consequences for

pupil achievement. Although the main goal of this study is not the psychological analysis of behaviors occuring within these learning settings in terms of their achievement consequences, some of the variables listed above may also contribute to differential effectiveness of settings in the same basic categories. Thus, these secondary setting characteristics will play a role in the analysis of achievement consequences. These consequences are discussed in Section 4 below.

4. Detailed Accounting for Curricular Content and the Consequences of Time Allocations for Pupil Achievement

The relationship between content coverage and achievement has three major aspects: the analysis of the content assessed by the achievement test, the analysis of the content covered in the instruction, and the relationship between them. The process involved in these analyses may be divided into a number of components.

1. Characterization of each item on each test as to subject matter content and the subdivision of all of the items into content categories allowing an assessment of subject matter composition for each test. This process could be termed a "content analysis" of test composition. It will allow us to generate content profiles for each test.

2. Assessment of the appropriateness of the subject matter content assessed by each test to the teachers' instructional programs as they are implemented in each school. This step is a critical one. A test item is appropriate for the achievement comparison of two classes only if it represents an implementation common to both. Differences in practices (time allocations) are differences in teaching consequences, but they should clearly be differentiated from differences in teaching efficacy. It is separation of differences in achievement due to differences in implementation, from those due to differences in the effectiveness of implemented components which is essential to the policy relevant evaluation of teaching. This assessment will be accomplished by comparing the content profile of each achievement test to profiles representing time allocations for curricular content categories. These allocations to specific categories will be derived from content codings based on the content analysis (1.) and the materials books discussed in Section II.1.3.

3. Specification of projected achievement test score differences resulting from differences in teaching implementations. On the basis of the content assessments of the tests, we will be able to project expected differences in: total test scores, subtest scores, and item scores between various classes (and pupils). These projections will be made on the basis of program implementations defined in terms of time allocations for content categories.

4. Specification of expected test score differences that would result

from tests with different content profiles. The process by which the expected differences will be generated in 3. can also be applied to a hypothetical test with any specified content profile. We can thus generate new content profiles which could be produced by different test construction processes and project the likely differences in test scores which would result from differences in teaching implementations. This task is important because, if the tests are greatly discrepant in content from the teachers' implementations, then all of the potential comparisons will be seriously misleading, and this will not be apparent without contrast to a hypothetical test which does fairly represent comparable content.

5. Analyses of actual test scores comparing classrooms and pupils. These data analyses will contrast the performance levels of classrooms and pupils, using total test scores, subtest scores, and item scores. The data analyses of actual achievement test scores will parallel the projections specified in 3.

6. Comparisons of actual test scores with projected scores based on variations in time allocations. Here we will relate projected (3.) and actual (5.) scores over classes and individual pupils using regression analysis. These regressions can also include characteristics of the teachers, pupils, and setting compositions to investigate their roles in the determination of achievements. In addition, more detailed analyses may be performed within and among classrooms to clarify the roles of

differing teaching (e.g., grouping) strategies.

It should be noted that teacher and pupil characteristics may have two different kinds of influences on the outcomes of teaching. One type is that mediated through planning, i.e., characteristics which affect the decisions teachers make. The other is unmediated, directly influencing the efficacy of planned activities. Thus, plans as well as implementations must be analyzed to differentiate the mode of influence of teacher and pupil characteristics on outcomes.

BIBLIOGRAPHY

Gump, P.V. The classroom behavior setting: Its nature and relation to student behavior. USOE Final Report. Lawrence, Kansas: University of Kansas, 1967 (Mimeographed).

Harnischfeger, A. and Wiley D.E., Teaching-Learning Processes in Elementary School: A Synoptic View. Studies of Educative Processes, No. 9, University of Chicago, 1975; and Technical Report 75-3-1, Beginning Teacher Evaluation Study, San Francisco: Far West Laboratory for Educational Research and Development, March, 1975.

Joyce, B.R. Variables, designs and instruments in the search for teacher effectiveness. Beginning Teacher Evaluation Study, Technical Report 75-6-4. San Francisco, California: Far West Laboratory for Educational Research and Development, October, 1975.

Morine, G. Special Study B: A study of teacher and pupil perceptions of classroom interaction. Beginning Teacher Evaluation Study, Technical Report 75-10-6, San Francisco, California: Far West Laboratory for Educational Research and Development, October, 1975.

Harnischfeger, Annegret and Wiley, David E. Notes for a field study of instructional time. San Francisco, California: Technical Report 75-10-11, Beginning Teacher Evaluation Study, Far West Laboratory for Educational Research and Development, October, 1975. (33 pages)

This paper follows up on an early report which presented a theory on instructional processes that relied on a time metric. In this paper a design for field studied within this theoretical orientation is presented. Methods to obtain information on how teachers allocate time so that grouping and individualization strategies can be studied are discussed. Sampling procedures for observations are recommended, and a data file structure for this kind of information is explained.